

Remarks

I. Introduction

This is in response to the final Office Action dated May 22, 2009 and is being filed with a Request for Continued Examination.

The Office Action rejected claims 1-3, 5-15, 18-19, 21-26, 29, and 31-32 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,996,828 (Kimura) in view of United States Publication No. 2004/0088710 (Ronkka). The Office Action rejected claims 17 and 20 under 35 U.S.C. § 103(a) as being unpatentable over Kimura in view of Ronkka, and further in view of Halang, "Real-time Systems" pages 291-313 (Halang). The Office Action rejected claims 27 and 28 under 35 U.S.C. § 103(a) as being unpatentable over Kimura in view of Ronkka, and further in view of U.S. Patent no. 6,725,260 (Philyaw). The Office Action rejected claims 16 and 30 under 35 U.S.C. § 103(a) as being unpatentable over Kimura in view of Ronkka, and further in view of U.S. Publication no. 2003/0041088 (Wilson)

Claims 1-3 and 5-32 are pending.

II. Rejections under 35 U.S.C. §103(a)

Independent claims 1, 14, 22, and 32 were rejected as being unpatentable over Kimura in view of Ronkka. In order to "establish *prima facie* obviousness of a claimed invention, all claim limitations must be taught or suggested by the prior art." In re Royka, 490 F.2d 981, 180 USPQ 580 (CCPA 1974). Furthermore, "all words in a claim must be considered in judging the patentability of that claim against the prior art." In re Wilson, 424 F.2d 1382, 1385, 165 USPQ 494, 496 (CCPA 1970). See also MPEP § 2143.03. The cited references, either alone or in combination, do not disclose all of the claim limitations of independent claims 1, 14, 22, and 32. Therefore, Applicants respectfully request withdrawal of the rejections under 35 U.S.C. §103(a).

The Examiner has maintained the same rejection as in the previous Office Action, without fully considering the Applicants' remarks submitted in the Amendment submitted March 5, 2009.

In the response to Arguments section of the Office Action, the Examiner states that "Applicant argued that Kimura do not teach the use of non-variable scan cycle timing...In response, examiner did not cite Kimura for teaching the step of the use of non-variable scan cycle timing. The response of October 3, 2008 in the RCE were [sic] moot, and examiner changed the new ground of rejection to cite Ronkka for teaching non-variable scan cycle timing." However, at page 12, paragraph 1 - page 13, paragraph 2 of the Amendment of March 5, 2009, Applicants previously presented an argument explaining that Ronkka does not disclose "non-variable scan cycle timing". The Office Action clearly did not consider this argument. Applicants repeat the argument explaining the Ronkka does not disclose "non-variable scan cycle timing below" and request consideration of this argument and allowance of all pending claims.

The present invention relates to a system and method for automatically reassigning an interface card and devices associated with a programmable logic controller system from a first operating environment to a second operating environment. In particular, the specification describes a method for adequately allocating resources between the operating environments that control the industrial machinery, thereby providing greater assurance of adequate response times to the controlled devices.

As described in the specification starting on page 6, line 22, a PC-based Programmable Logic Controller (PLC) environment includes a computer that controls several industrial devices in a manufacturing environment. As shown in Figure 1, the PLC interfaces with these industrial devices via expansion cards. The structure of PLC communications to the various industrial devices, disclosed on page 7, line 17, is based on a "scan cycle", which is a cycle of communication to all industrial devices that are interfaced to the PLC.

Page 6, lines 10-20 of the specification describes how the demands on the PLC operating system may increase, usually as a result of the addition of industrial devices to the PLC. An increased demand for PLC real-time processing could adversely impact the PLC's efficiency and response times to the industrial devices under its control. As a result, the additional demands on the PLC may vary or delay the cycle of communications from the PLC to the industrial devices. A variance in the scan cycle timing could have a detrimental effect on the manufacturing operations of the industrial devices that require immediate processing.

Page 7, line 21 discloses one aspect of the invention. The operating system for a PC-based PLC is migrated to an environment where the scan cycle timing is not variable. A PLC operating environment with non-variable scan cycle timing provides greater assurance that the resources for the PLC will be adequately provided during the times of peak servicing and control of the industrial devices. This aspect of the present invention is reflected in independent claim 1, as amended. In particular, independent claim 1, as amended, recites the limitation, "wherein said second operating environment has non-variable scan cycle timing".

The combination of Kimura and Ronkka does not disclose this limitation of independent claim 1.

Kimura discloses a method for multi operating system configuration on a single computer. Kimura, at column 2, lines 32-44, discloses the division of the computer's physical memory for each of a plurality of operating systems, thereby enabling a single computer to run a plurality of operating systems. However, the operating systems as disclosed by Kimura do not disclose the use of non-variable scan cycle timing. Therefore, as admitted by the Office Action, Kimura does not disclose the limitation of "said second operating environment has non-variable scan cycle timing" as claimed in claim 1.

Ronkka is directed to a communication device with a processor that runs multiple operating systems. As described at paragraph [0060], one operating system relates to running mobile station functions, and the other operating system relates to running data processing functions. As described at paragraphs [0060] and [0085] of Ronkka, one of the operating systems can be a real time operating system that has certain execution time requirements. As described at paragraphs [0002] and [0003] of Ronkka, an advantage of real time operating systems over non-real time operating systems is that a response time for external interrupts can be predicted in real time operating systems. Although Ronkka describes the use of a real time operating system, Ronkka does not describe any non-variable scan cycle timing in such a real time operating system. As described above, a scan cycle is a cycle of communication to all industrial devices that are interfaced to the PLC. Although paragraph [0003] of Ronkka describes predictable response time and execution speed of a real time operating system, there is no description in Ronkka of a non-variable cycle of communication to industrial devices interfaced to the operating system.

In the Office Action, the Examiner states that “timer for OS_A so called real-time operating system can be lengthen [sic] or have been determined, 0003, 0060, 0085”. While these cited portions of Ronkka describe responses times can lengthen in non-real time operating systems, as compared with real time operating systems, and that response times can be determined in the kernel of real time operating systems, these cited portions of Ronkka do not contain any description of the real time operating system having a non-variable scan cycle. As described in the previous Response of October 3, 2008, a real-time operating system is not the same as an operating environment with non-variable scan cycle timing. Ronkka does not disclose the use of such non-variable scan cycle timing. Therefore, Ronkka does not disclose the limitation of “said second operating environment has non-variable scan cycle timing” as claimed in claim 1.

For the reasons described above, neither Kimura nor Ronkka, separately or in combination, discloses the limitation, “wherein said second operating

environment has non-variable scan cycle timing" as recited in amended independent claim 1. Therefore, independent claim 1 is allowable over the cited art.

Independent claims 14, 22, and 32 each recite the limitation "wherein said second operating environment has non-variable scan cycle timing". For the reasons discussed above in connection to independent claim 1, the cited art does not disclose this limitation, and independent claims 14, 22, and 32 are allowable over the cited art.

All remaining claims are dependent upon an allowable independent claim and are therefore also allowable.

III. Conclusion

For the reasons discussed above, all pending claims are allowable over the cited art. Reconsideration and allowance of all claims is respectfully requested.

Respectfully submitted,

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